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Liquid-Cooled Liner for Helmets

Liquid-cooled garments may be used to provide thermal balance and to maintain comfortable living conditions for astronauts, crewmen, or other personnel exposed to heat-stress situations. Although there may be conditions when it is not practical to use garments which are completely cooled, removal of some excess metabolic heat by garments which cool only certain parts of the human body often provides a satisfactory degree of comfort.

The results of a series of studies have indicated that removing heat from the head and neck areas affords an extraordinarily efficient means for cooling aircrews or other thermally stressed individuals. Unfortunately, cooling tubes, manifolds, supporting structures, and coolant feeder lines are ordinarily of such size and weight that the liquid-cooled aircrew helmets constructed prior to this time have been altogether too bulky and heavy for widespread use.

Recently, it has been found that a highly satisfactory liquid-cooled helmet can be constructed with a new, specially-developed liner which acts at the same time as the coolant tubing, manifold, and supporting structures. The liner is essentially a "fabric" of a waffle-design made of several integrated channels (or capillaries) through which a coolant liquid can flow. The cooling liner is exceptionally thin and light in weight; in fact, it is possible to incorporate the liner into a standard helicopter aircrew helmet.

Experiments with heat-stressed individuals wearing liquid-cooled liner helmets have demonstrated that sweat loss is reduced by 60%, the heart rate is reduced by more than 60% (index of heat strain), and the normal deleterious climb of core temperature is sup-

pressed by more than 50%. Moreover, there are indications that helmet cooling may markedly delay or even correct thermal fatigue and improper thermal balance in aircrew members or other heat-stressed individuals.

The cooling liner can be incorporated into any type of helmet or head gear, such as fireman hats, race-car driver helmets, miner's safety helmets, and medical or surgical headwear.

Note:

Requests for further information may be directed to:

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Patent status:

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